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TECH CENTER 4000/2000 Docket Number 3273-0121P

Clean copy of claims pending in this application:

1. A process for producing an organic compound which is an addition or substitution reaction product of a compound (A) and a compound (B) or an oxidized product thereof, said process comprising the step of allowing

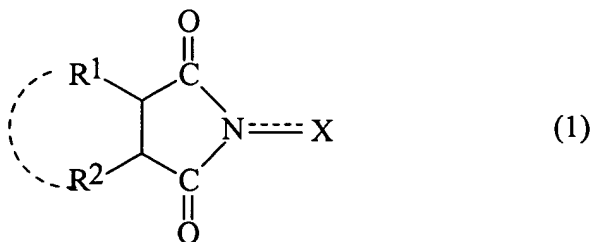
- (A) a compound capable of forming a stable radical and being selected from
 - (A1) oxygen-atom-containing compounds each having a carbon-hydrogen bond at the adjacent position to an oxygen atom,
 - (A2) carbonyl-group-containing compounds, and
 - (A3) compounds each having a hydrocarbon group with a methine carbon atom

to react with

- (B) a radical scavenging compound selected from
 - (B1) unsaturated compounds,
 - (B2) compounds each having a hydrocarbon group with a methine carbon atom, and
 - (B3) heteroatom-containing compounds,

provided that if a 1,2-dicarbonyl compound or its hydroxy reductant is used as the compound (A), the compound (B) is a radical scavenging compound selected from the compounds (B1) and (B3),

in the presence of a catalytic imide compound and in the presence of molecular oxygen, by catalysis of the imide compound, wherein the imide compound is shown by the following formula (1):



wherein each of R^1 and R^2 is, identical to or different from each other, a hydrogen atom, a halogen atom, an alkyl group, an aryl group, a cycloalkyl group, a hydroxyl group, an alkoxy group, a carboxyl group, an alkoxycarbonyl group, or an acyl group, where R^1 and R^2 may be combined to form a double bond, or an aromatic or non-aromatic ring; X is an oxygen atom or a hydroxyl group; and one or two N-substituted cyclic imido groups indicated in the formula (1) may be further bonded to said R^1 , R^2 , or to the double bond or aromatic or non-aromatic ring formed together by R^1 and R^2 ,
to yield a product of an addition or substitution reaction of said compound (A) and said compound (B) or an oxidized product thereof.

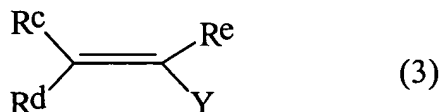
2. A process for producing an organic compound according to claim 1, wherein

compound (A) is (A11) an alcohol shown by the following formula (2):



wherein each of R^a and R^b is, identical to or different from each other, a hydrogen atom or an organic group, where R^a and R^b may be combined to form a ring with the adjacent carbon atom, and

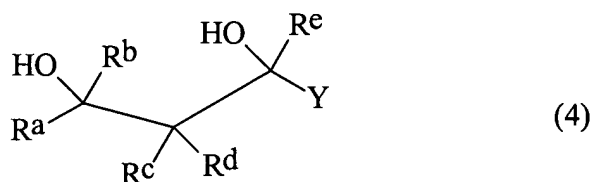
compound (B) is (B11) an active olefin shown by the following formula (3):



wherein each of R^c , R^d , and R^e is, identical to or different from one another, a hydrogen atom or an organic group, and Y is an electron attracting group, where

R^c, R^d, R^e, and Y may be combined to form a ring with the adjacent carbon atom or carbon-carbon bond, and

wherein the organic compound which is an addition or substitution reaction product or an oxidized product thereof is a 1,3-dihydroxy compound shown by the following formula (4):



wherein R^a, R^b, R^c, R^d, R^e, and Y have the same meanings as defined above.

3. The process for producing an organic compound according to claim 1, wherein

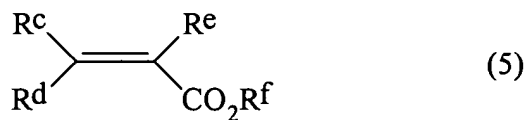
compound (A) is (A11) an alcohol shown by the following formula (2):



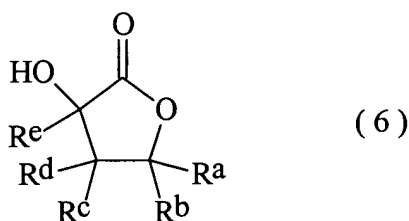
wherein each of R^a and R^b is, identical to or different from each other, a hydrogen atom or an organic group, where R^a and R^b may be combined to form a ring with the adjacent carbon atom,

and

compound (B) is (B12) an α,β-unsaturated carboxylic acid derivative shown by the following formula (5):



wherein each of R^c , R^d , R^e , and R^f is, identical to or different from one another, a hydrogen atom or an organic group, where R^c , R^d , and R^e may be combined to form a ring with the adjacent carbon atom or carbon-carbon bond, and wherein the organic compound which is an addition or substitution reaction product or an oxidized product thereof is an α -hydroxy- γ -butyrolactone derivative shown by the following formula (6):



wherein R^a , R^b , R^c , R^d , and R^e have the same meanings as defined above.

14. A process for producing an organic compound according to claim 1, wherein

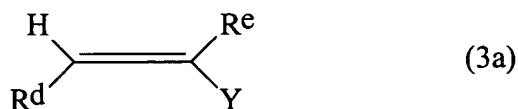
compound (A) is (A12) an alcohol shown by the following formula (2a):



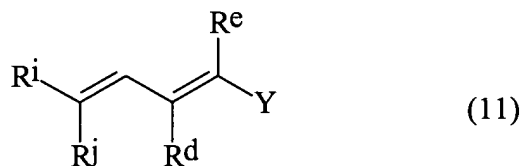
wherein each of R^i and R^j is, identical to or different from each other, a hydrogen atom or an organic group, where R^i and R^j may be combined to form a ring with the adjacent carbon atom,

and

compound (B) is (B13) an active olefin shown by the following formula (3a):

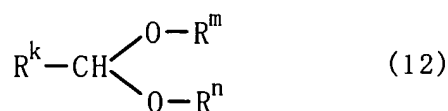


wherein each of R^d and R^e is, identical to or different from each other, a hydrogen atom or an organic group; and Y is an electron attracting group, where R^d , R^e and Y may be combined to form a ring with the adjacent carbon atom or carbon-carbon bond, and wherein the organic compound which is an addition or substitution reaction product or an oxidized product thereof is a conjugated unsaturated compound shown by the following formula (11):



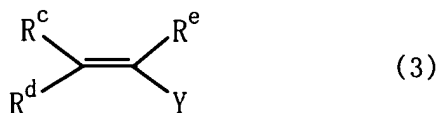
wherein R^d , R^e , R^i , R^j and Y have the same meanings as defined above.

15. A process for producing an organic compound according to claim 1, wherein (A13) an acetal shown by the following formula (12):

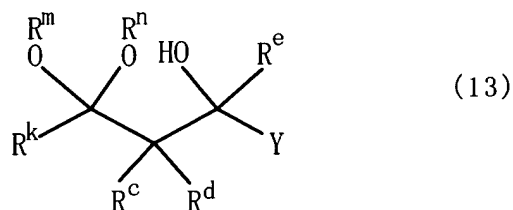


wherein each of R^k , R^m , and R^n is, identical to or different from one another, a hydrogen atom or an organic group, where R^m and R^n may be combined to form a ring with the adjacent two oxygen atoms and the carbon atom indicated in the formula,

is allowed to react with (B11) an active olefin shown by the following formula (3):



wherein each of R^c , R^d , and R^e is, identical to or different from one another, a hydrogen atom or an organic group, and Y is an electron attracting group, where R^c , R^d , R^e , and Y may be combined to form a ring with the adjacent carbon atom or carbon-carbon bond, in the presence of molecular oxygen by catalysis of the imide compound of the formula (1), to yield a β -hydroxyacetal compound shown by the following formula (13):

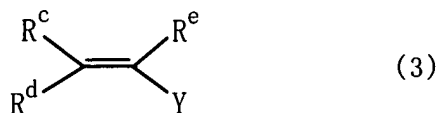


wherein R^c , R^d , R^e , R^k , R^m , R^n , and Y have the same meanings as defined above.

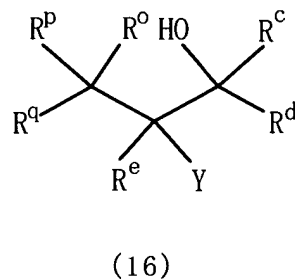
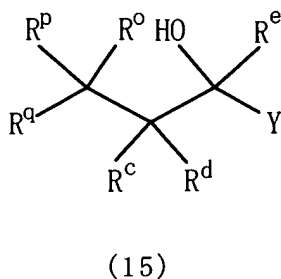
16. A process for producing an organic compound according to claim 1, wherein (A31) a compound having a methine carbon atom and being shown by the following formula (14):



wherein each of R^o , R^p , and R^q is, identical to or different from one another, an organic group, where R^o , R^p , and R^q may be combined to form a ring with the adjacent carbon atom, is allowed to react with (B11) an active olefin shown by the following formula (3):



wherein each of R^c , R^d , and R^e is, identical to or different from one another, a hydrogen atom or an organic group; and Y is an electron attracting group, where R^c , R^d , and Y may be combined to form a ring with the adjacent carbon atom or carbon-carbon bond, in the presence of molecular oxygen by catalysis of the imide compound of the formula (1), to yield at least one hydroxy compound selected from the following formulae (15) and (16):

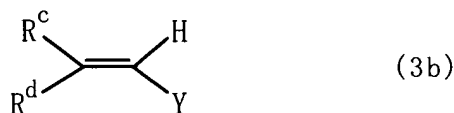


wherein R^c , R^d , R^e , R^o , R^p , R^q , and Y have the same meanings as defined above.

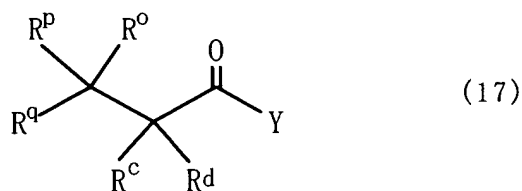
17. A process for producing an organic compound according to claim 1, wherein (A31) a compound having a methine carbon atom and being shown by the following formula (14):



wherein each of R^o , R^p , and R^q is, identical to or different from one another, an organic group, where R^o , R^p , and R^q may be combined to form a ring with the adjacent carbon atom,
is allowed to react with (B14) an active olefin shown by the following formula (3b):



wherein each of R^c and R^d is, identical to or different from each other, a hydrogen atom or an organic group; and Y is an electron attracting group, where R^c , R^d , and Y may be combined to form a ring with the adjacent carbon atom or carbon-carbon bond,
in the presence of molecular oxygen by catalysis of the imide compound of the formula (1), to yield a carbonyl compound shown by the following formula (17):



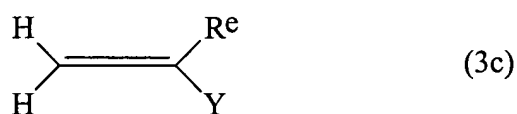
wherein R^c , R^d , R^o , R^p , R^q , and Y have the same meanings as defined above.

18. The process for producing an organic compound according to claim 1, wherein

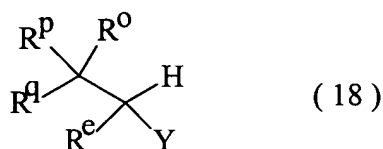
compound (A) is (A31) a compound having a methine carbon atom and being shown by the following formula (14):



wherein each of R^0 , R^p and R^q is, identical to or different from one another, an organic group, where R^0 , R^p , and R^q may be combined to form a ring with the adjacent carbon atom,
and
compound (B) is (B15) an active olefin shown by the following formula (3c):



wherein R^e is a hydrogen atom or an organic group; and Y is an electron attracting group,
and wherein the organic compound which is an addition or substitution reaction product or an oxidized product thereof is an organic compound shown by the following formula (18):



wherein R^e , R^0 , R^p , R^q , and Y have the same meanings as defined above.

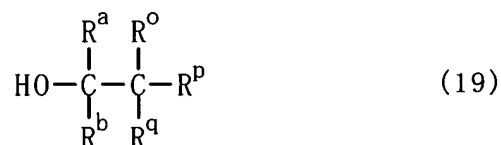
19. A process for producing an organic compound according to claim 1, wherein (A11) an alcohol shown by the following formula (2):



wherein each of R^a and R^b is, identical to or different from each other, a hydrogen atom or an organic group, where R^a and R^b may be combined to form a ring with the adjacent carbon atom,
is allowed to react with (B21) a compound having a methine carbon atom and being shown by the following formula (14):



wherein each of R^o , R^p , and R^q is, identical to or different from one another, an organic group, where R^o , R^p , and R^q may be combined to form a ring with the adjacent carbon atom,
in the presence of molecular oxygen by catalysis of the imide compound of the formula (1), to yield an alcohol shown by the following formula (19):



wherein R^a , R^b , R^o , R^p , and R^q have the same meanings as defined above.

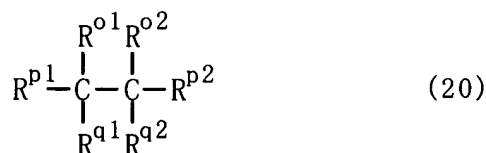
20. A process for producing an organic compound according to claim 1, wherein (A32) a compound having a methine carbon atom and being shown by the following formula (14a):



wherein each of $\text{R}^{\text{o}1}$, $\text{R}^{\text{p}1}$ and $\text{R}^{\text{q}1}$ is, identical to or different from one another, an organic group, where $\text{R}^{\text{o}1}$, $\text{R}^{\text{p}1}$ and $\text{R}^{\text{q}1}$ may be combined to form a ring with the adjacent carbon atom, is allowed to react with (B22) a compound having a methine carbon atom and being shown by the following formula (14b):



wherein each of $\text{R}^{\text{o}2}$, $\text{R}^{\text{p}2}$ and $\text{R}^{\text{q}2}$ is, identical to or different from one another, an organic group, where $\text{R}^{\text{o}2}$, $\text{R}^{\text{p}2}$ and $\text{R}^{\text{q}2}$ may be combined to form a ring with the adjacent carbon atom, in the presence of molecular oxygen by catalysis of the imide compound of the formula (1), to yield a coupling product shown by the following formula (20):



wherein $\text{R}^{\text{o}1}$, $\text{R}^{\text{p}1}$, $\text{R}^{\text{q}1}$, $\text{R}^{\text{o}2}$, $\text{R}^{\text{p}2}$ and $\text{R}^{\text{q}2}$ have the same meanings as defined above.

21. A process according to one of claims 1 to 3 and 14 to 20, wherein a metallic compound is used as a co-catalyst.